UNIT 16 – NUCLEAR CHEMISTRY

BALANCING NUCLEAR REACTIONS WORKSHEET

Predict the missing product or reactant in the following nuclear reactions. Determine the type of nuclear reaction (α emission, β emission, γ emission, positron emission, artificial transmutation, fission, or fusion) described.

		Type of Nuclear Reaction
1.)	$^{42}_{19}K \rightarrow {}^{0}_{-1}e +$ _____	1.)
2.)	$^{239}_{94}Pu \rightarrow {}^{4}_{2}He +$ _____	2.)
3.)	$^{235}_{92}U \rightarrow$ _____ $+ {}^{231}_{90}Th$	3.)
4.)	$^{1}_{1}H + {}^{3}_{1}H \rightarrow$ _____	4.)
5.)	$^{6}_{3}Li + {}^{1}_{0}n \rightarrow {}^{4}_{2}He +$ _____	5.) ---
6.)	$^{27}_{13}Al + {}^{4}_{2}He \rightarrow {}^{30}_{15}P +$ _____	6.)
7.)	$^{9}_{4}Be + {}^{1}_{1}H \rightarrow$ _____ $+ {}^{4}_{2}He$	7.)
8.)	$^{37}_{19}K \rightarrow {}^{0}_{+1}e +$ _____	8.)
9.)	_____ $+ {}^{1}_{0}n \rightarrow {}^{142}_{56}Ba + {}^{91}_{36}Kr + 3\,{}^{1}_{0}n$	9.)
10.)	$^{238}_{92}U + {}^{4}_{2}He \rightarrow$ _____ $+ {}^{1}_{0}n$	10.)
11.)	$^{14}_{6}C \rightarrow {}^{14}_{7}N +$ _____	11.)
12.)	$^{187}_{75}Re +$ _____ $\rightarrow {}^{188}_{75}Re + {}^{1}_{1}H$	12.)
13.)	$^{22}_{11}Na +$ _____ $\rightarrow {}^{22}_{10}Ne$	13.) ---
14.)	$^{218}_{84}Po \rightarrow$ _____ $+ {}^{4}_{2}He$	14.)
15.)	$^{253}_{99}Es + {}^{4}_{2}He \rightarrow {}^{1}_{0}n +$ _____	15.)

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HALF-LIFE PROBLEMS WORKSHEET

1.) What is the half-life of a 100.0 g sample of nitrogen-16 that decays to 12.5 grams in 21.6 seconds?

2.) All isotopes of technetium are radioactive, but they have widely varying half-lives. If an 800.0 gram sample of technetium-99 decays to 100.0 g of technetium-99 in 639,000 years, what is its half-life?

3.) A 208 g sample of sodium-24 decays to 13.0 g of sodium-24 within 60.0 hours. What is the half-life of this radioactive isotope?

4.) If the half-life of iodine-131 is 8.10 days, how long will it take a 50.00 g sample to decay to 6.25 g?

5.) The half-life of hafnium-156 is 0.025 seconds. How long will it take a 560 g sample to decay to one-fourth of its original mass?

6.) Chromium-48 has a short half-life of 21.6 hours. How long will it take 360.00 g of chromium-48 to decay to 11.25 g?

7.) Potassium-42 has a half-life of 12.4 hours. How much of an 848 g sample of potassium-42 will be left after 62.0 hours?

8.) Carbon-14 has a half-life of 5730 years. How much of a 144 g sample of carbon-14 will remain after 1.719×10^4 years?

9.) If the half-life of uranium-235 is 7.04×10^8 years and 12.5 g of uranium-235 remain after 2.82×10^9 years, how much of the radioactive isotope was in the original sample?